Rehab@Home

- Remote physiotherapy monitoring for rehabilitation -

This demo shows an exercise session for patients in rehabilitation after shoulder, hip or knee surgery by using the Kinect sensor device and Kinect for Windows SDK (C#).

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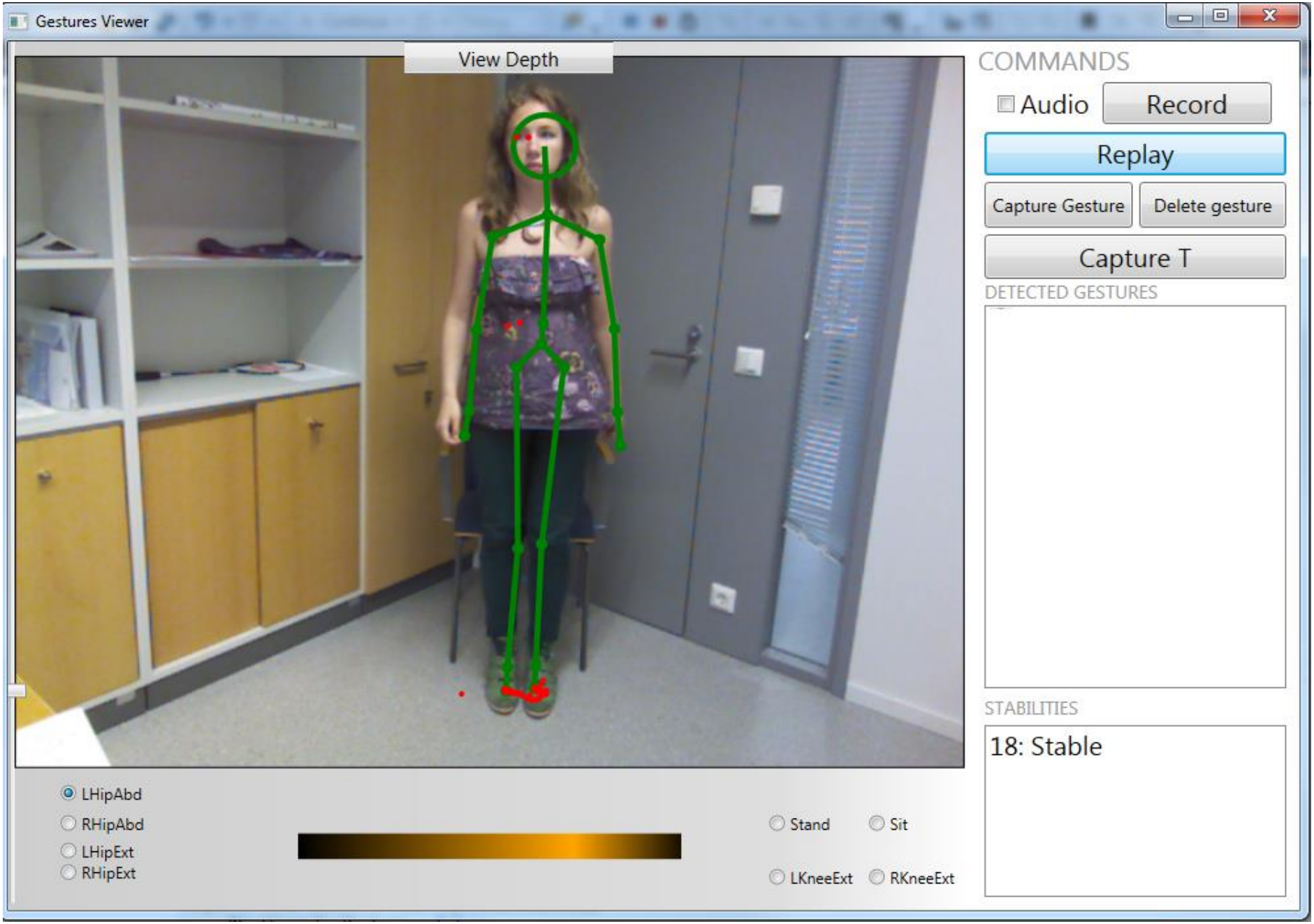
User interface

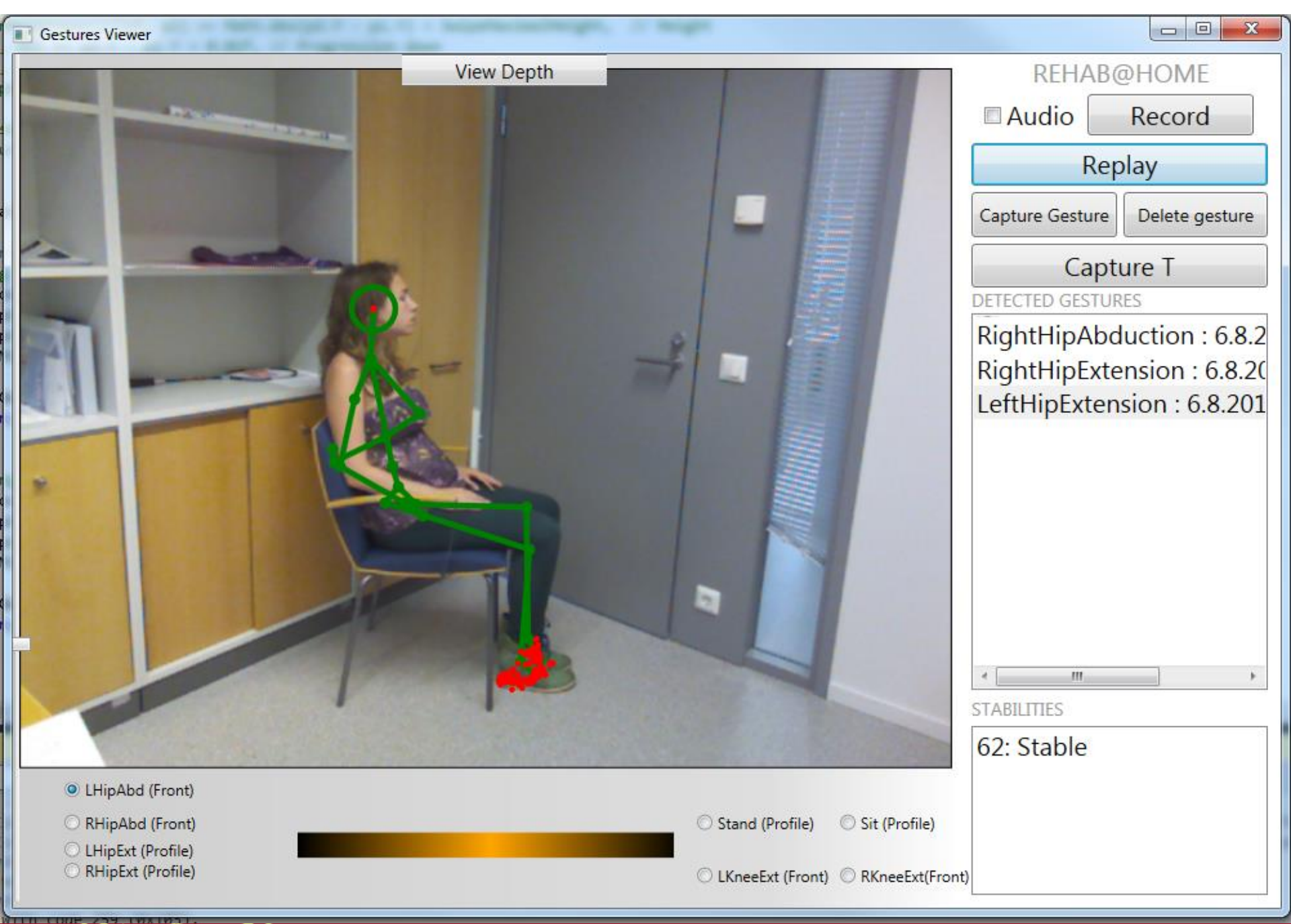
Allows recording new patterns from new users realizing exercises for the system to learn to recognize them:

- **Record** and **Replay**: Records a session for training the system. Audio option activates and ends recording via voice ("Record", "Stop")
- **Stabilities**: Indicates the degree of stability of the skeleton tracked.
- **Capture** and **Delete Gesture**: Adds (and deletes) a template gesture to a gesture learning model.
- **Capture T**: adds a template posture to a posture learning model.
- **View Depth/View color**: Shows depth/color image
- **Exercises** to be trained &recognized:
  - In FRONT position with the camera:
    - **Left and RightHipAbduction**
    - **Left and RightKneeExtension**
  - In PROFILE position with the camera:
    - **Left and RightHipExtension**
    - **Sit and Stand**

Background

- The context of our project falls within one of today's key problems in society: the ageing of the population.
- New technological solutions are needed to allow more independent living, at the same time as easier and more accessible healthcare and wellbeing.
- Our project supports this paradigm not only providing a general physiotherapy and rehabilitation remote solution for home but also, in the future, other use case scenarios, such as human activity recognition in different Smart Spaces (home, office, hospital, etc.).
- The business opportunities for our framework are multiple and versatile: in health-care (for care-takers, at home) in industry processes or in any Smart Space for remote monitoring. We consider commercialization after development.


Gestures Viewer
View Depth
COMMANDS
Audio
Record
Replay
Capture Gesture
Delete gesture
Capture T
DETECTED GESTURES
STABILITIES
18: Stable
LHipAbd
RHipAbd
LHipExt
RHipExt
Stand
Sit
LKneeExt
RKneeExt


Gestures Viewer
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Capture Gesture
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Capture T
DETECTED GESTURES
RightHipAbduction : 6.8.2
RightHipExtension : 6.8.2(
LeftHipExtension : 6.8.201
STABILITIES
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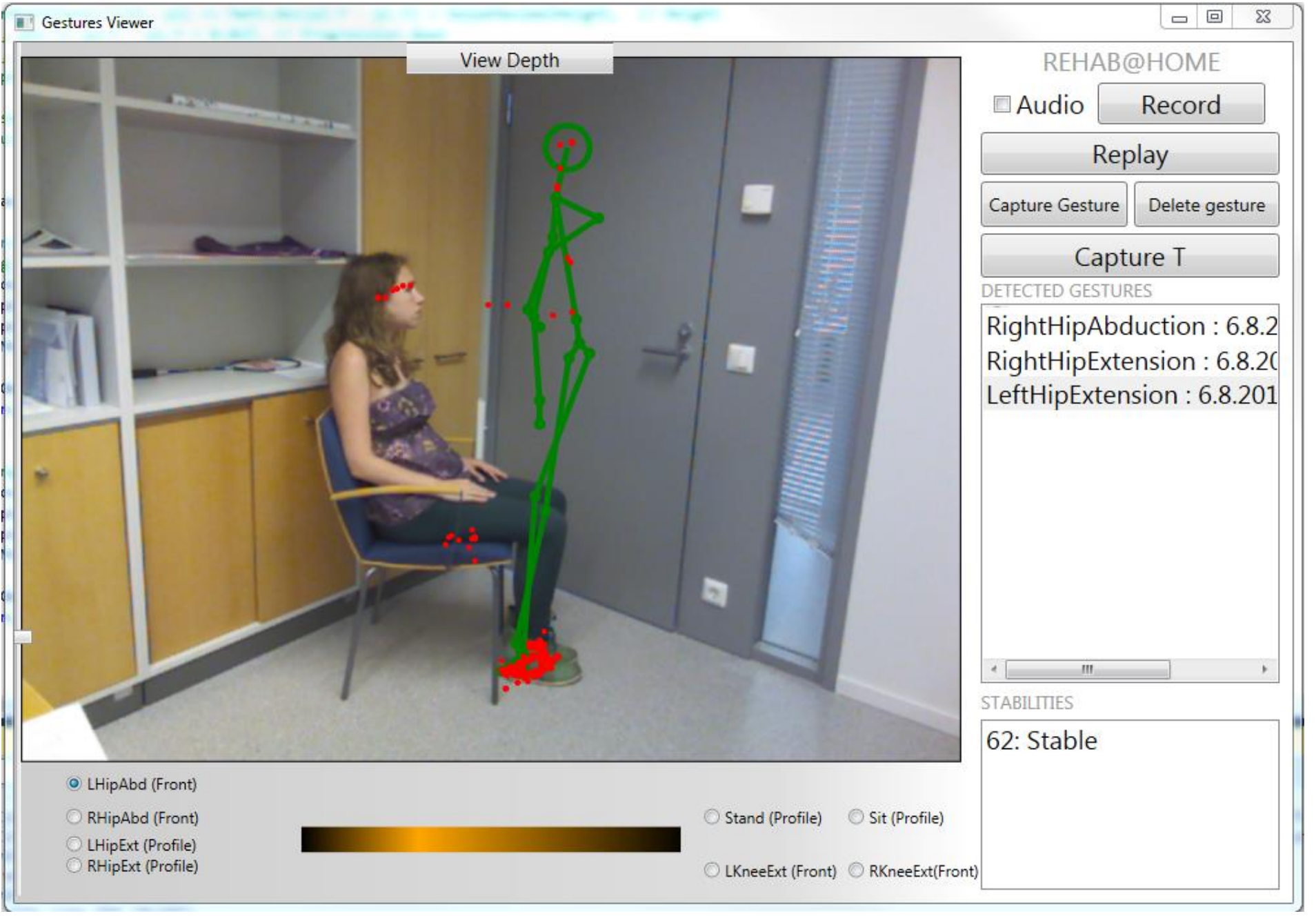
LHipAbd (Front)
RHipAbd (Front)
LHipExt (Profile)
RHipExt (Profile)
Stand (Profile)
Sit (Profile)
LKneeExt (Front)
RKneeExt(Front)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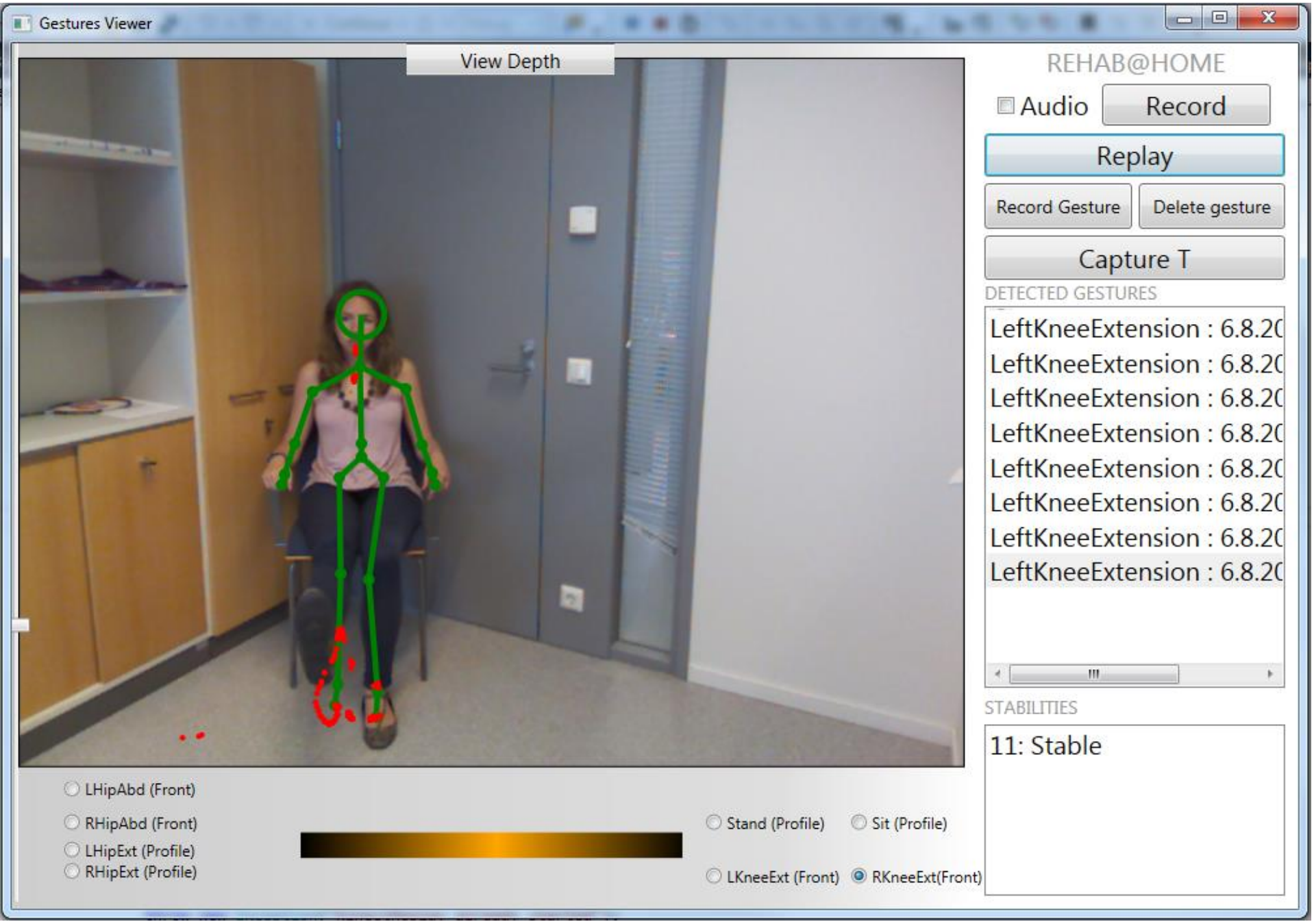
Gestures Viewer
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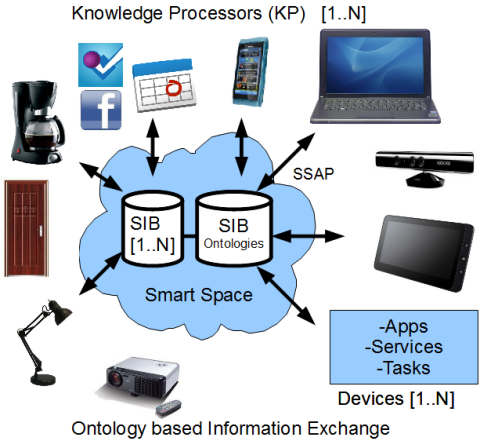
RHipAbd (Front)
LHipExt (Profile)
RHipExt (Profile)
Stand (Profile)
Sit (Profile)
LKneeExt (Front)
RKneeExt(Front)

Future Directions



- Integration with semantic Smart Space Architecture
  - Eg. To obtain long-term evolution/changes
- Extension of exercises and precision.

More information:

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